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KEWA

NEWSLETTER OF THE LONDON CHAPTER,
ONTARIO ARCHAEOLOGICAL SOCIETY

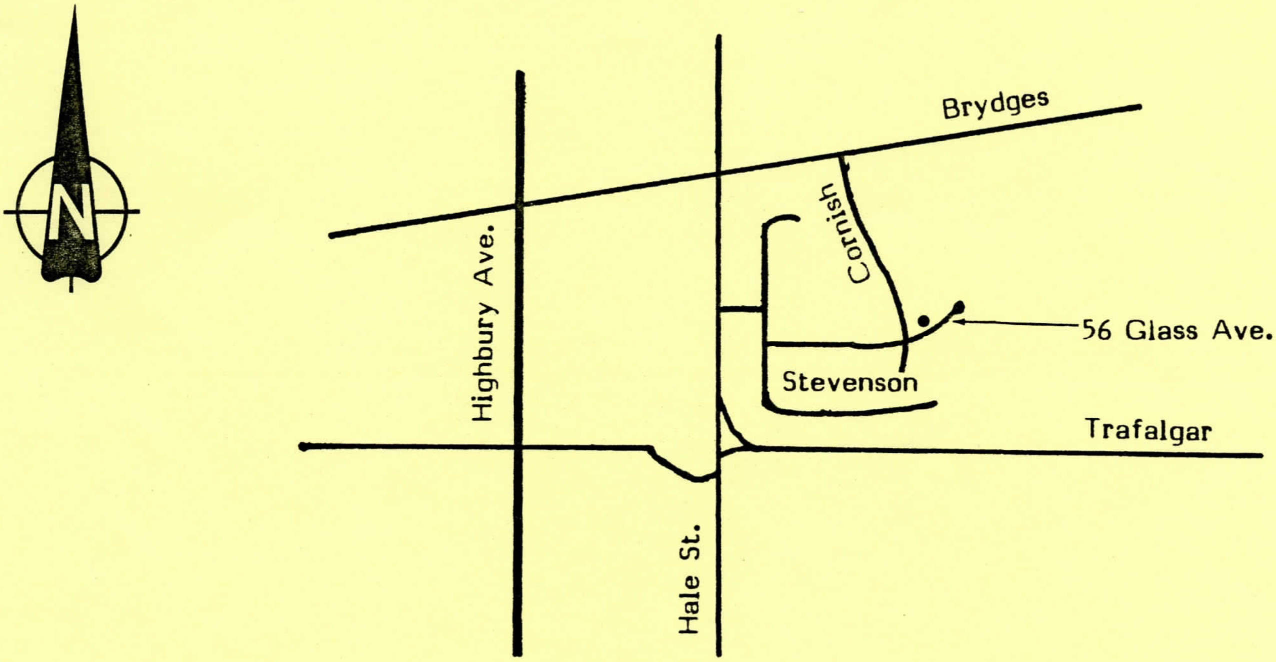
November, 1987

87-8

Yes, it is time once again for...

THE ANNUAL CHAPTER CHRISTMAS PARTY!!!

This year Chapter member Jim Esler has extended to us the facilities of his home for our Christmas Party. The location is in east London (see map), at 56 Glass Avenue. The Party is to be held on Friday December 18th, at 7 PM. Car pools can be arranged for members if required, just contact one of the executive members for further information. So come on out, share in some turkey, good food and good times, and bring family and friends to meet some real-live archaeologists (what do they do when there is snow on the ground?)! Warning: wanton destruction of furniture and light fixtures will not be tolerated this year (just kidding, Jim!).



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EXECUTIVE REPORT

While it may only seem like yesterday (which probably isn't too far off considering our mailing record), a full year's supply of **KEWA**s has almost past us by again. Of course, when one talks of the end of the year, two things come to mind: renewing membership dues and forming a new Chapter executive. While the former will be discussed in our next issue, the latter needs to be set as soon as possible. Any Chapter member in good standing with both the Chapter and the main body of the OAS can offer to run for a position on the executive. Positions are awarded by acclamation, unless two or more individuals wish to run for the same position, in which case an election is held. At least one executive position (secretary) is definitely being vacated this year, although we do have at least one individual who has expressed a desire to fill Bob's place. The remaining members of the executive have indicated that they are willing to stand another year, however any position can be contested. Finally, there is a new position on the executive, that of director, which has not been spoken for as yet. Anyone interested in working as part of the Chapter executive in one of the less demanding positions available, please indicate your desire to do so. Nominations will be accepted up to the December 18th Chapter Christmas party.

Another matter which needs to be discussed pertains to the current status of **KEWA** mailings. It has been mentioned before that the amount of work required for producing one issue of **KEWA** is fast exceeding the abilities of the Chapter's editorial committee. Even with a greater number of individuals assisting the editorial committee, our mailing delays will soon start to go beyond three or four weeks. While we have saved time in the past by having the newsletter produced through a fast-print shop, this method is proving too costly. Moreover, membership dues are only paying for approximately 70% of production costs on a year's supply of **KEWA**. These two factors combined seem to indicate a need for change. The executive thus has proposed two alternatives for the membership to consider. First, we can change the format of **KEWA** by making it a bi-monthly mailing, much like **Arch Notes** is presently. If this alternative is followed, every effort would be made to provide the membership with issues that would be more substantive than what any single one is now, so that the six mailings per annum would still give a year's membership/subscription dues worth of value. The second alternative proposed would see **KEWA** remain relatively unchanged, but our May issue would be deleted. This would still provide members with 8 issues a year. Thus the overall cost of producing a year's supply of our newsletter would be reduced, and the most difficult issue of **KEWA** in a given year to produce, due to field obligations, would be eliminated. As it stands now, the May issue tends to be mailed in early July! Chapter members are asked to comment on this proposal either at the Annual Business Meeting during our Christmas Party, or at the January speaker night, or by phoning or writing the executive. Should no indication from the membership be received, the executive will select one of the two alternatives listed above, and begin implementation in the new year, so please give us some guidance on this issue.

Finally, just prior to the onset of snow, the Van Bemmel excavations were wrapped up for this year. In all, some 26 Chapter members and others volunteered on the site over the course of excavations, providing the project with a total of 537 hours of volunteer work. Results to date have been promising for documenting this late fall hunting and processing camp, occupied by Younge Phase peoples around ca. 1100 A.D. Associated material culture and settlement data have been both exciting and confusing! A preliminary report of our findings at the site for 1987 will appear in an upcoming issue of **KEWA**. As far as excavation projects for next year go, at the very least work will continue at Van Bemmel, both in the Younge Phase portion of the field rented by Mr. Bert Van Bemmel this past year, as well as some of the probable archaic stations also located in the area. Anyone wishing to coordinate another field project for Chapter members next year, particularly one closer to London, please contact the executive.

SOCIAL REPORT

As advertised on the cover of **KEWA**, our annual Chapter Christmas party will be hosted this year at 56 Glass Avenue in east London, on Friday December 18th. The event will start around 7 PM in the evening, and as is our tradition, the Chapter will provide a Turkey and all the trimmings. To those who might like to assist: salads, veggies, desserts, buns, condiments and whatever else you can think of would be most appreciated. BYOB of course, although the Chapter will also provide some Christmas cheer. So please bring out family and friends, and share the season's spirit. If you are planning to bring something or would otherwise like to help organize this event, please let a member of the executive know at 433-8401, or contact Julia at 451-8121.

In light of the Christmas season, Lab nights will be cancelled following the one held on December 3rd, and will commence once more on the Thursday evening of January 7, 1988. Our thanks to those who attended Lab nights during the fall season, and we hope to see you once again in the new year. To those who have yet to drop by but are thinking of it, lab nights provide members opportunities to learn something about artifact processing, identification, analysis and conservation. Other projects members can be involved with during lab nights include photography, report production, and site specific analysis projects. If you have a topic in mind that you'd like to learn about in a hands on way, just show up at the next lab night and express an interest...we aim to please! Lab nights are held every Thursday evening at 55 Centre Street, except for speaker nights, and start around 7 PM.

EDITOR'S NOTE

This month's research article is provided for your interest by Jacqueline Fisher, a former undergraduate student of Chris Ellis's at the University of Waterloo. Her undergraduate thesis discussed the broadpoint complex from two concentrations in southwest Ontario. While readers will be familiar with the Ausable area site cluster (including the Parkhill Site), this report represents the first occasion that data from the Brodie site and the archaeologically rich Komoka area west of London has appeared in print. Also, readers will note that the script of this report is different. The Chapter simply took advantage of the word-processing skills of Chris Ellis and the equipment at the Unviersity of Waterloo in order to obtain a copy of this paper. As many of you know, Chris is also the editor of our Prehistory of Southern Ontario Occasional Publication Series volume. The format and script of the volume will be quite similar to that presented here, so consider this a taste of what to expect!

On another note, our Editorial Committee is slowly coming together. One member, Sean Moore, has been helping by word-processing the article submissions for December's issue of **KEWA**, which will help to get that issue out quicker than it might have otherwise. However, our committee is still looking for other members. We need individuals who can act as proof-readers, word-processors, production assistants, and mailing-list updaters. If you can spare a couple of days or nights a month, or if you are willing to work on **KEWA** from your own home (ie. proof-read there), we can use you. Please contact Neal Ferris at 55 Centre Street (433-8401), or at any lab or speaker night. Where else can you see your accomplishments appear right before your eyes as every issue of **KEWA** is produced?!

BRODIE AND PARKHILL: AN ANALYSIS OF TWO LATE ARCHAIC BROADPOINT SAMPLES FROM SOUTHWESTERN ONTARIO

Jacqueline A. Fisher

An important manifestation of the Late Archaic in Eastern North America is the "broadpoint" horizon of ca. 3250-4250 B.P. While much research has been carried out on both sides of the Great Lakes (Ritchie 1969; Turnbaugh 1975; Cook 1976; Witthoft 1953; Kenyon 1980a, 1980b, 1981, 1983, 1985; and others), there remain large gaps in knowledge concerning the manufacture, use, age, and distribution of these materials. In particular, although the most recognizeable components of these assemblages are broadpoints, there are still many unanswered questions pertaining to the sources of variation in these stone tools.

Introduction

This study will develop new, and test pre-existing, propositions concerning the sources of broadpoint variation in three areas. First, Kenyon (1980a) has suggested that some variation in the broadpoints may be due to the raw material. Kenyon (1980a) notes that stem thickness and blade length are specifically affected by the type of raw material employed. Second, Kenyon (1980a:33) also notes that certain attributes may vary due to reworking (ie. blade length), while others (shoulder width, stem width, etc.) do not. The third proposal is that some of the variation may reflect change through time. Kenyon (1980a) has produced a seriation of various broadpoint sites based on certain attributes which are not biased due to reworking or lithic material type. These propositions will be evaluated and tested using point samples from the Brodie (Delaware) and Parkhill sites in southwestern Ontario.

Background

Many separate point types are ascribed to the "broadpoint" horizon. In general, these points can be identified as having "a blade of triangular form, with overall large shallow, flake scars and with its basal corners removed to form a broad stem" (Turnbaugh 1975:51). Another characteristic of broadpoints is the type of lithic material used. Materials such as quartzite (Watson 1981), greywacke (Roosa 1966; Kenyon 1980), and other coarse-grained rocks seem to have been more often selected for use over the more easily worked cherts and flints. Kenyon (1980a:18) suggests that "in Ontario the production of greywacke bifaces is confined to areas where supplies of large flaw-free cherts were so scarce that the prehistoric knappers relied on local, secondary sources of coarse grained rock." Where there are sources of large flaw-free cherts, such as Onondaga in the Niagara Peninsula, the coarse-grained materials are rarely used.

In eastern Michigan and southwestern Ontario, the metasediment subgreywacke is the predominant coarse-grained rock found in broadpoint assemblages. Assemblages that include points on this lithic material are often referred to under the cultural taxon of the "Satchell Complex". However, Kenyon (1980a:18) has suggested that this designation is of little utility as a cultural marker except if taken in the broadest possible sense. The use of this material simply reflects its local geological availability in these two regions, and is part of a much wider pattern of coarse-grained rock use throughout areas where the "broadpoint" horizon occurs. For example, Witthoft (1953:8) notes that Susquehanna broadpoints of Pennsylvania and New York are primarily "made of the purplish rhyolite which originated in Franklin and Adams Counties". Similarly, Watson (1981) states that the broadpoints from the Rideau Canal area are often made on quartzite, and Ellis (personal communication) reports black metasediment broadpoints in the lower Trent River Valley.

While the "Satchell Complex" has general geographic boundaries, the age of the complex is still being debated. From lake strandline data, Peske (1963) concludes that the "argillite industry" or "Satchell Complex" is Late Paleo Indian falling between 7000 and 4000 B.C. (9000 to 6000 B.P. years). However, Roosa felt that "...the Michigan Satchell Complex, *if taken as a unit* [Roosa's emphasis], is Late Archaic" (1966:33). Recent research tends to support Roosa's (1966) suggestion (see Kenyon 1980a, 1980b).

For example, in Ontario, there are three carbon 14 dated sites which support the idea that the "Satchell Complex" is Late Archaic and part of the "broadpoint" horizon. The Davidson site is dated at 3780 +/- 85 B.P.

(Kenyon 1980b:19). The Adder Orchard site has two carbon-14 dates of 2360 +/- 90 B.P. and 3850 +/- 90 B.P. (Kenyon 1983:9). Kenyon (1983:9) believes the first of the these dates to be too recent and thus, erroneous. Parkhill is the third site which has yielded a carbon date. This date "is from a feature...that produced a large greywacke bifacial reduction flake and yielded a C-14 reading of 1450 B.C." (3400 +/- 210 B.P.; I-8866) (Deller et al 1985:8). It should be noted that this date was obtained from another section of the site, and not from the area containing the sample of broadpoints examined for this study.

Thus, the dates from the above sites and those elsewhere indicate that the "broadpoint" horizon in Ontario and particularly the "Satchell Complex" is not Paleo-Indian but Late Archaic and has a temporal depth of approximately 1000 carbon-14 years between ca. 4250 and 3250 B.P.

There are two known major clusters of Broadpoint sites within southwestern Ontario containing points of coarse-grained lithics. They are the Ausable and Komoka clusters (Figure 1), which Kenyon (1980a:20) places at "the junction of the Carolinian and Canadian Biotic Provinces...[and] corresponds very closely to the known northern limit of Satchell artifacts." If the "Satchell Complex" is to be disregarded as a cultural taxon, then the Carolinian Biotic zone is not the only area to contain broadpoint components.

Watson (1981) notes that the broadpoints and other artifacts from the Inderwick Site in the Rideau Lakes system are similar to Snook Kill, DeTurk, Bare Island, and the "Batten Kill" complex. Roberts (1985) documents numerous broadpoint sites around Burlington and Oakville, and along the northern shore of Lake Ontario. As well, Chris Ellis (personal communication) indicates that there are also some major broadpoint sites along the Trent waterway.

The Samples

a) Parkhill. The Parkhill site (see Figure 1) is located in the Ausable Cluster. Although the site is just east of the Ausable Valley proper, it is still within the area of the Thedford Embayment as are the Davidson, Sadler, Desjardins and Adder Orchard sites reported by Kenyon (1980a, 1983). Parkhill and Davidson share a similarity in site location. The Parkhill site is located by Parkhill Creek, while Davidson is beside the Ausable River. In both cases the two sites are situated where the adjacent drainage system enters the Thedford Embayment.

At the Parkhill site there are two concentrations of broadpoints. One concentration is minor and corresponds with the Paleo Indian area or Grid "D" at the site (Roosa 1977). The other is situated directly beside Parkhill Creek. The sample to be analysed in this paper is taken entirely from a surface collection from this second location.

The Parkhill sample contains sixteen bifaces. The majority are made on Onondaga chert (see Table 1), and there are no subgreywacke bifaces. This contrasts with the majority of the other Ausable sites because excepting Adder Orchard, the "coarse-grained rocks constitute about 30% to 50% of the points" (Kenyon 1985:9). The Parkhill sample contains one biface which is made from Bayport chert. This material has "a very limited distribution in southwestern Ontario and it is rare in the Ausable Valley with the exception of the PaleoIndian period" (Kenyon 1985:22). Kenyon (1985) notes that from the Desjardins site there are only two stemmed Bayport points, and from the other sites of Sadler, Davidson, and Adder Orchard there are none.

Three of the bifaces from Parkhill are preforms. All are made on Onondaga chert, and two are pentagonal in outline (Figure 3a). Such pentagonal preforms are common on broadpoint sites over a large area (Kenyon 1981; Witthoft 1953). The Parkhill pentagonal preforms, in that they are made on Onondaga, appear to be a rarity because they "seem to be common only near the sources of raw materials from which they were made" (Kenyon 1981:5). Pentagonal preforms of Kettle Point chert are frequently found in the Ausable Valley, but not Onondaga ones which have to be carried in from distant outcrops at the eastern end of Lake Erie. The presence of these Onondaga preforms, as well as the rarity of subgreywacke and Kettle Point bifaces compared to other sites in the area, may simply reflect the amount of time elapsed since the group arrived in the area after having procured the Onondaga chert. The occupants of Parkhill could have recently visited or obtained these chert items while on an annual cycle of movement (Ellis, personal communication). Therefore, they would have sufficient quantities and large enough pieces of Onondaga chert in their kits for tool replacement without having to replace supplies with local rocks (ie. Kettle Point chert and subgreywacke) as seems to be the case on other Ausable sites.

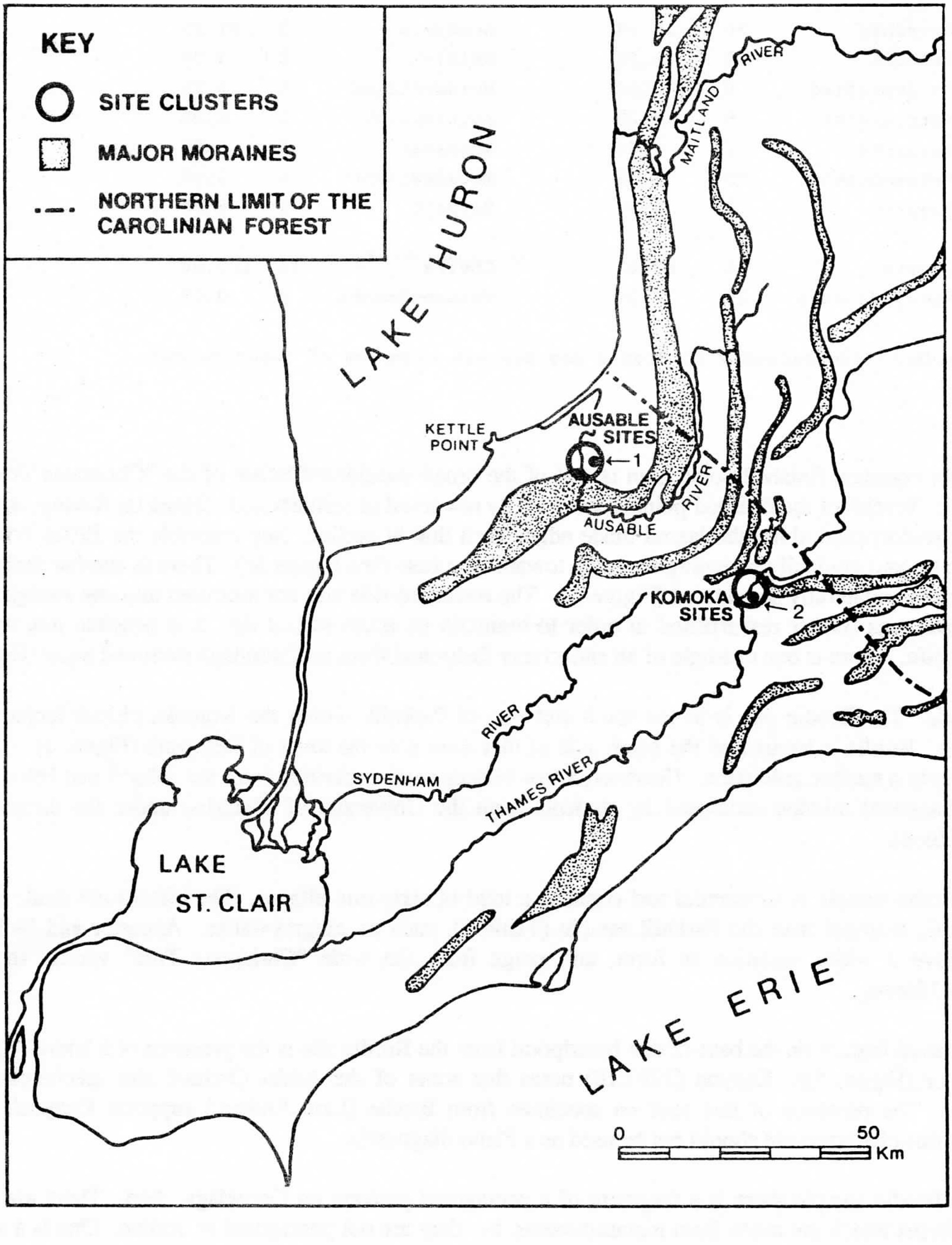


Figure 1: Location of Broadpoint Site Clusters in Southwestern Ontario. Numbers indicate site locations (1 = Parkhill Site; 2 = Brodie Site).

Table 1: Lithic Material*

Brodie Lithic Type	#	%	Parkhill Lithic Type	#	%
Onondaga	34	55.74	Onondaga	13	81.25
Selkirk	5	8.20	Selkirk	0	0.00
Unidentified	6	9.84	Unidentified	1	6.25
Kettlepoint	5	8.20	Kettlepoint	1	6.25
Ancaster	1	1.64	Ancaster	0	0.00
Metasediment	10	16.39	Metasediment	0	0.00
Bayport	0	0.00	Bayport	1	6.25
Cherts	51	83.61	Cherts	16	100.00
Metasediments	10	16.39	Metasediments	0	0.00

* The unidentified category at Brodie may contain examples of Upper Mercer.

The most common finished point form is that of the broad-shouldered biface of the "Christmas Tree" variety (see Figure 3). Several of the finished points seem heavily reworked or resharpened. Based on flaking, some appear to have been resharpened along the lateral blade edges such that in outline, they resemble the Eiffel Tower, being narrow at the tip and gradually widening in an arc towards the base (see Figure 3c). There is another form of biface present, which is unilaterally shouldered (Figure 3i). The reworked side was not modified into one straight edge, but rather the blade was further resharpened in order to maintain an acute angled tip. It is possible this item served largely as a knife. There is one example of an endscraper fashioned from an Onondaga stemmed point (Figure 3j).

b) Brodie. The Brodie site is to the south and east of Parkhill, within the Komoka cluster located near the Thames River. Brodie is located on the south side of that river near the town of Delaware (Figure 1). The Brodie sample is largely a surface collection. However, a few bifaces were excavated from the subsoil just below a Middle Woodland (Saugeen) midden excavated by students from the University of Waterloo under the direction of Dr. William B. Roosa.

The Brodie sample is substantial and contains a total of sixty-one bifaces. The bifaces are made on a wider variety of lithic material than the Parkhill sample (Table 1), such as subgreywacke, Ancaster and Selkirk chert. They also have a wider variation in form, and range from the wide "Christmas Tree" variety to the more narrow-bladed forms.

An unusual feature on the base of one broadpoint from the Brodie site is the presence of a laterally protruding nubble or spur (Figure 5j). Kenyon (1983:10) notes that some of the Adder Orchard site specimens have this characteristic. The presence of this spur on specimen from Brodie (Late Archaic) supports Kenyon's argument (1983:5) that this characteristic should not be used as a Plano diagnostic.

In the Brodie sample there is a fragment of a pentagonal preform on Onondaga chert. There are also three possible preforms which are made from metasediments, but they are not pentagonal in outline. One is a very rough preform, while the others are more refined forms.

As in the Parkhill sample, some bifaces have been recycled or extensively reworked. These reworked bifaces include drills (Figure 4e,l,m), two of which are missing their tips. All have been so heavily reworked that where the shoulders should have been, only shoulder spurs remain. Two are made on Onondaga chert, while the other one is from an unidentified coarse white granular chert. Unilaterally shouldered bifaces (Figure 4f,g,h,j,k), probably knives, are also present in the sample. Of the unilaterally shouldered bifaces, three are on Onondaga chert. Another is smaller and finer than the others and is from an unidentified dark chert. The final one is from a metasediment, probably slate. There are no tip impacts present, which suggests that these tools were not used as projectile points. An endscraper or "strike-a-light" (Figure 4i) made from a metasediment (subgreywacke) stemmed point is also present. The end of the blade has been heavily worn down and smoothed by use.

There is another biface form present in the Brodie sample which has had the tip worn down (Figure 4c,d). These examples display a use wear pattern where the tip has been extremely smoothed down, and has a highly polished appearance. The two examples are both on subgreywacke. One is a large rough preform, and the other is a stemmed, narrow-shouldered lanceolate biface. Kenyon (1980a:28) illustrates three such bifaces (all lanceolate unstemmed) and states that "the wear pattern suggests that these bifaces were vigorously rubbed against some fairly soft, yielding substance..." With these worn tips, it seems highly unlikely that these bifaces in their final form were used as projectile points.

Data Collection

Before going directly into the analysis of the broadpoints, the methods of collecting the data should be noted. The metrics for the Brodie and Parkhill artifacts are derived directly from the artifacts, unlike Kenyon (1980a:36) where some measurements of broadpoints from New York State (Weir and Oatman) and North Carolina (Doerschuk) "were obtained by measuring the specimens illustrated in the reports cited." All data in this report are taken from complete measurements, and dimensions have not been estimated.

The shoulder widths for those specimens which have been heavily reworked into other tool forms are not incorporated into the data. Also, the preforms from both sites are not incorporated into the data summaries.

The following attributes have been measured for this report after Kenyon (1980b): blade length (BL); overall length (OL); stem length (SL); stem width (SW); shoulder height (ShH); shoulder width (ShW); base width (BW); stem thickness (ST); maximum thickness (MT); and weight (W). The measurement of tip bluntness (TB) was taken by placing the broadpoint tip on and perpendicular to a flat surface between the tines of calipers (ie. measured at a consistent 4 mm from the tip). Tip angles (TA) refers to the divergence of the lateral edges from the tip and was measured with a contact goniometer. Appendices 1 and 2 list the measurements for each individual biface in the Parkhill and Brodie samples.

Analysis

a) Variation Due to Raw Material. The main tool form associated with the "broadpoint" horizon in Ontario is the broadpoint biface. While it is the diagnostic artifact, little is known concerning many of its attributes. Kenyon (1980a) has attempted to clarify "the taxonomic and temporal relationships of the Ontario Satchell sites." To ascertain attributes useful for placing collections in time and space, Kenyon (1980a:35) states that some continuous variables such as shoulder width, stem width, base width, and stem length should be compared, while other variables such as blade length and stem thickness should be disregarded because they "reflect differing lithic properties rather than the `mental templates' of the stone knappers" (Kenyon 1980a:35). This is particularly the case between items made on cherts and coarse-grained rocks. Of the two samples examined here, only the Brodie site contains both fine and coarse-grained rocks which will permit the evaluation of this proposition.

Data for the metasediment and chert samples at Brodie are presented on Table 2 and Figure 2. Figure 2 shows that at the 0.05 confidence limit there is a significant difference between the cherts and metasediments with respect to several attributes. In agreement with Kenyon (1980a:33), there is a significant difference between cherts and metasediments concerning blade length and overall length of the broadpoints. As Kenyon (1980a) pointed out, the blade length and overall length are determined not only by the lithic material used, but also are affected by the amount of resharpening. Thus, it is possible that metasediments are less often or less markedly resharpened due perhaps to the actual "toughness" of the subgreywacke. The subgreywacke, being a more resistant material is less likely to break extensively in use. This would mean that these bifaces would more often be discarded in a longer and larger form. Also, it could have been more difficult to rework the bifaces. Some of the subgreywacke bifaces had numerous step fractures which indicated difficulty in flaking. Thus, the toughness of the lithic material may determine a biface's overall length and blade length. In turn, this will determine the weight, for the longer and larger a biface is, the more it will weigh, (density aside). Therefore, it is not surprising that metasediment bifaces also weigh significantly more than the chert bifaces (see Table 2 and Figure 2).

These data are in agreement with Kenyon (1980a) that attributes such as blade length, overall length, as well as weight, may not be useful for purposes of placing assemblages in space and time. However, there are some contrasts with Kenyon's (1980a) data. For example, the data from Brodie (see Figure 2) indicates that there is no

Figure 2: Confidence Limits (0.05) For the Brodie Site Sample.

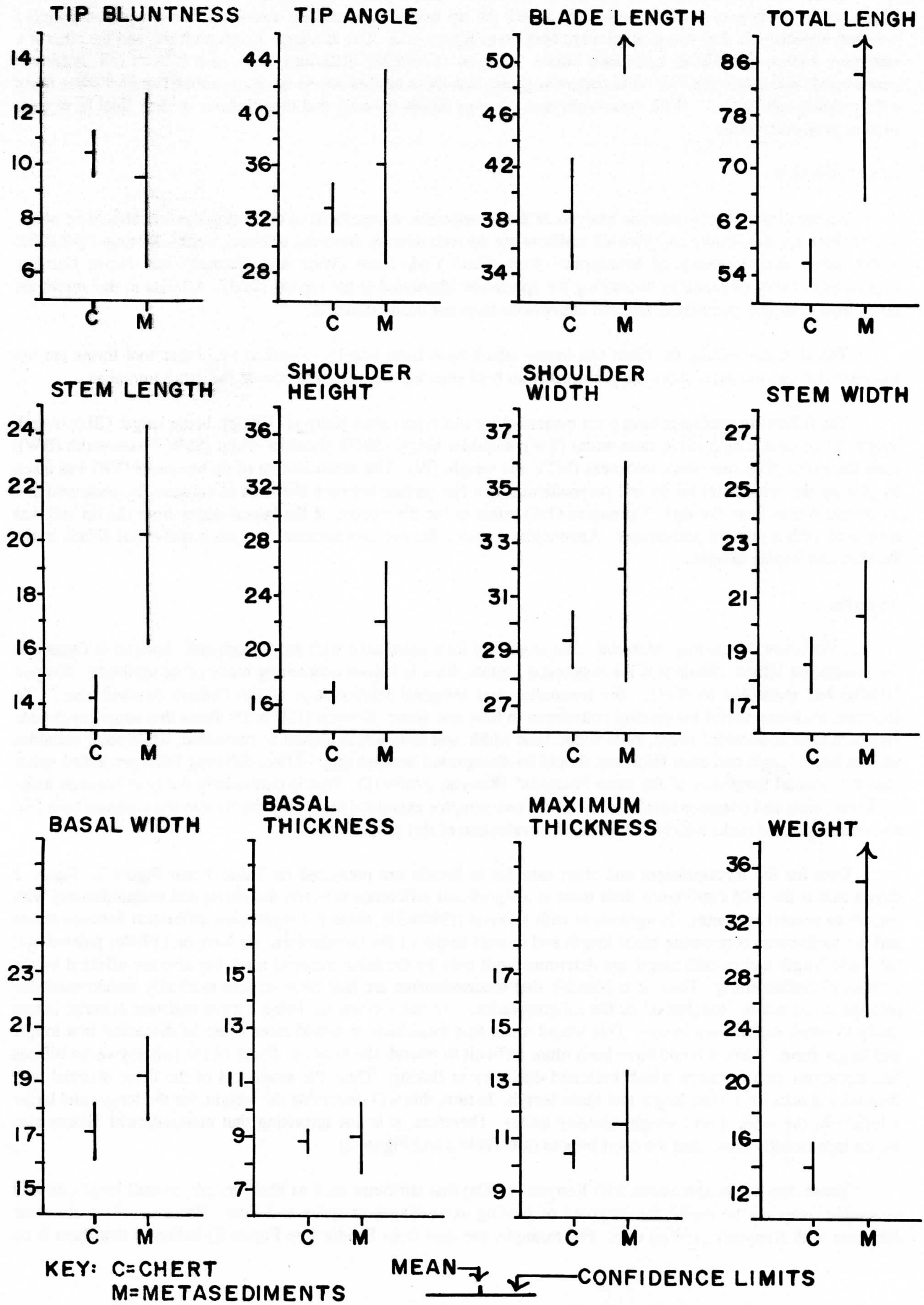
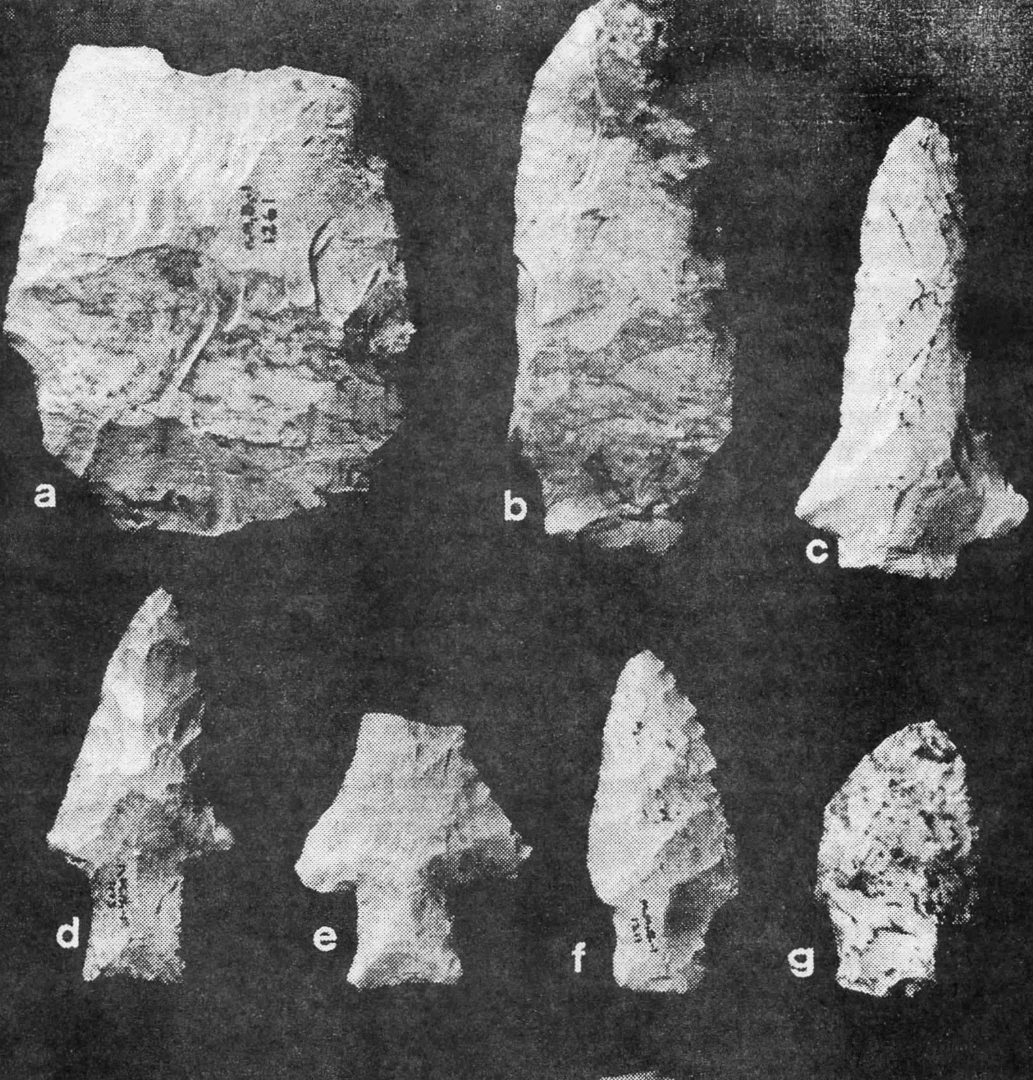


Table 2: Brodie Broadpoint Metrics

	Mean (mm)	Standard Deviation	Sample Size	Coefficient of Variation
CHERTS				
Stem Length	14.25	2.67	40	18.75
Shoulder Width	29.47	3.78	33	12.83
Stem Width	18.66	2.82	40	15.10
Basal Width	17.39	3.08	38	17.74
Tip Bluntness	10.54	2.65	37	25.14
Tip Angle	33.14	5.61	37	16.93
Blade Length	38.85	11.66	32	30.01
Shoulder Height	17.03	2.84	40	16.67
Overall Length	56.75	11.42	32	20.13
Stem Thickness	8.88	1.44	44	16.18
Maximum Thickness	10.43	1.79	51	17.18
Weight	13.94	5.19	31	37.22
METASEDIMENTS				
Stem Length	20.35	3.86	6	18.97
Shoulder Width	32.04	3.27	5	10.21
Stem Width	20.38	2.01	6	9.86
Basal Width	19.21	1.64	7	8.54
Tip Bluntness	9.68	2.05	4	21.18
Tip Angle	36.25	4.50	4	12.41
Blade Length	67.65	2.05	2	3.30
Shoulder Height	22.05	4.16	6	18.87
Overall Length	84.07	7.38	3	8.78
Stem Thickness	9.08	1.33	6	14.65
Maximum Thickness	11.68	2.38	8	20.38
Weight	35.50	4.36	3	12.28
TOTAL				
Stem Length	15.05	3.49	46	23.19
Shoulder Width	29.82	3.78	38	12.68
Stem Width	18.89	2.77	46	14.66
Basal Width	17.67	2.97	45	16.81
Tip Bluntness	10.53	2.57	41	24.41
Tip Angle	33.44	5.55	41	16.60
Blade Length	40.54	13.23	34	32.63
Shoulder Height	17.69	3.44	46	19.45
Overall Length	59.09	13.50	35	22.85
Stem Thickness	8.90	1.41	50	15.84
Maximum Thickness	10.60	1.91	59	18.02
Weight	15.84	8.01	34	50.57

significant difference between cherts and metasediments concerning mean stem thickness. Kenyon (1980a:35) noted that metasediment points are significantly thicker in his sample, and attributed this "to the difficulty of thinning preforms made of granular lithics." This presumably is a reasonable inference, but it would not explain why the Brodie sample differs in this regard.

Another contrast with Kenyon's (1980a) data is that stem length may also be affected by raw material. In the Brodie sample, there is a significant difference with respect to stem length between the two lithic classes of raw material (see Figure 2 and Table 2). Specifically, the stem lengths of the metasediment bifaces are significantly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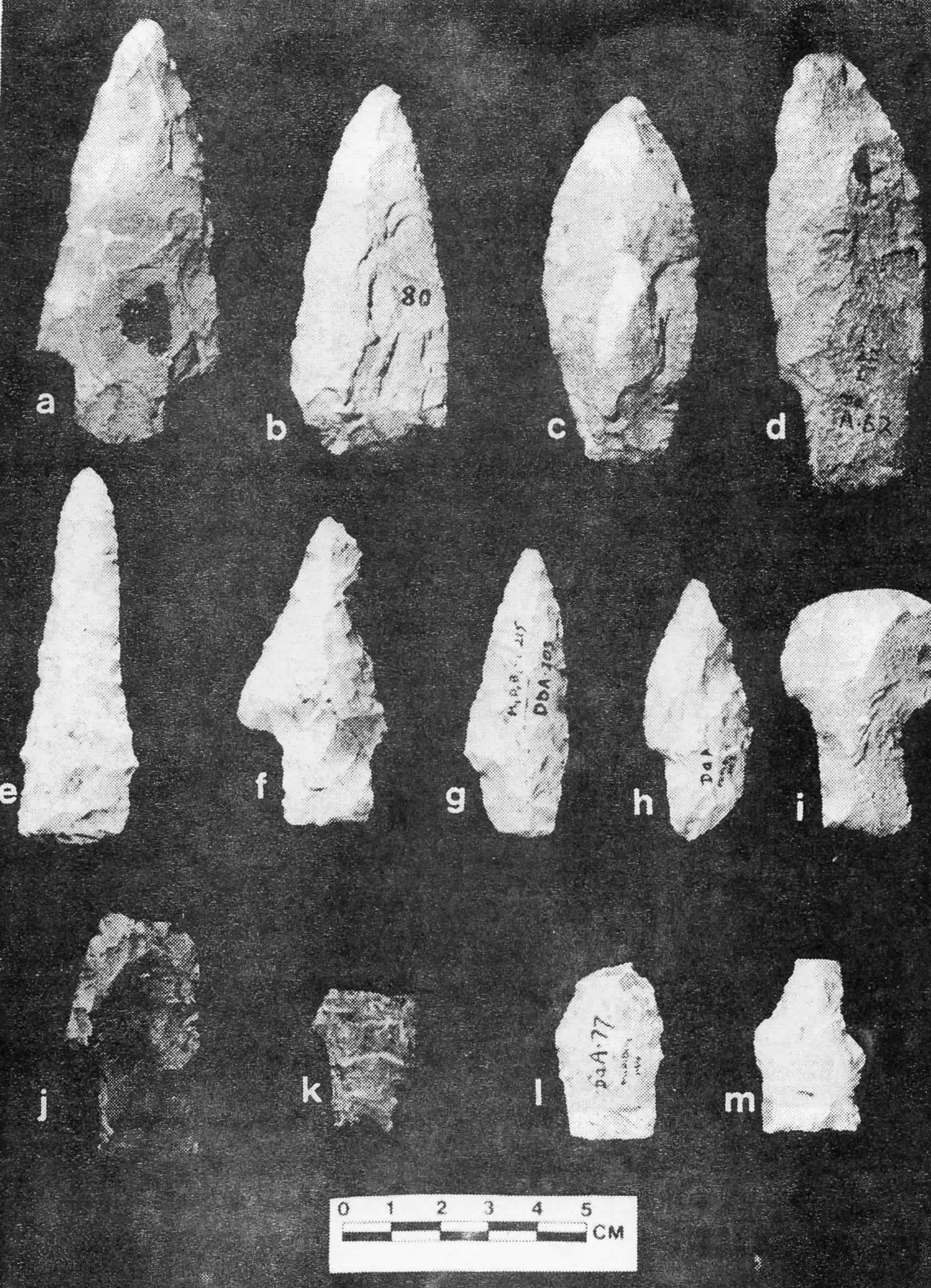
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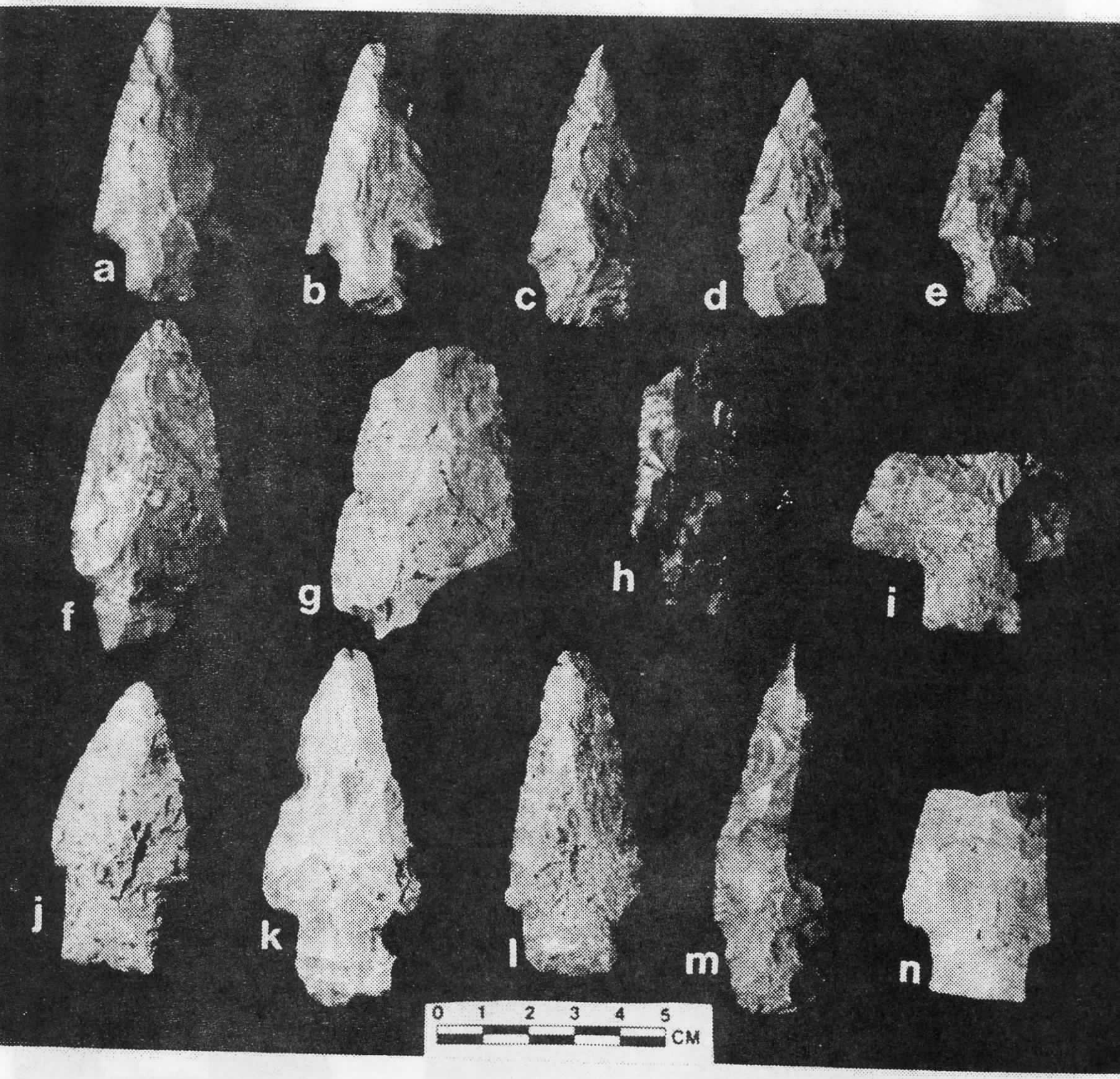
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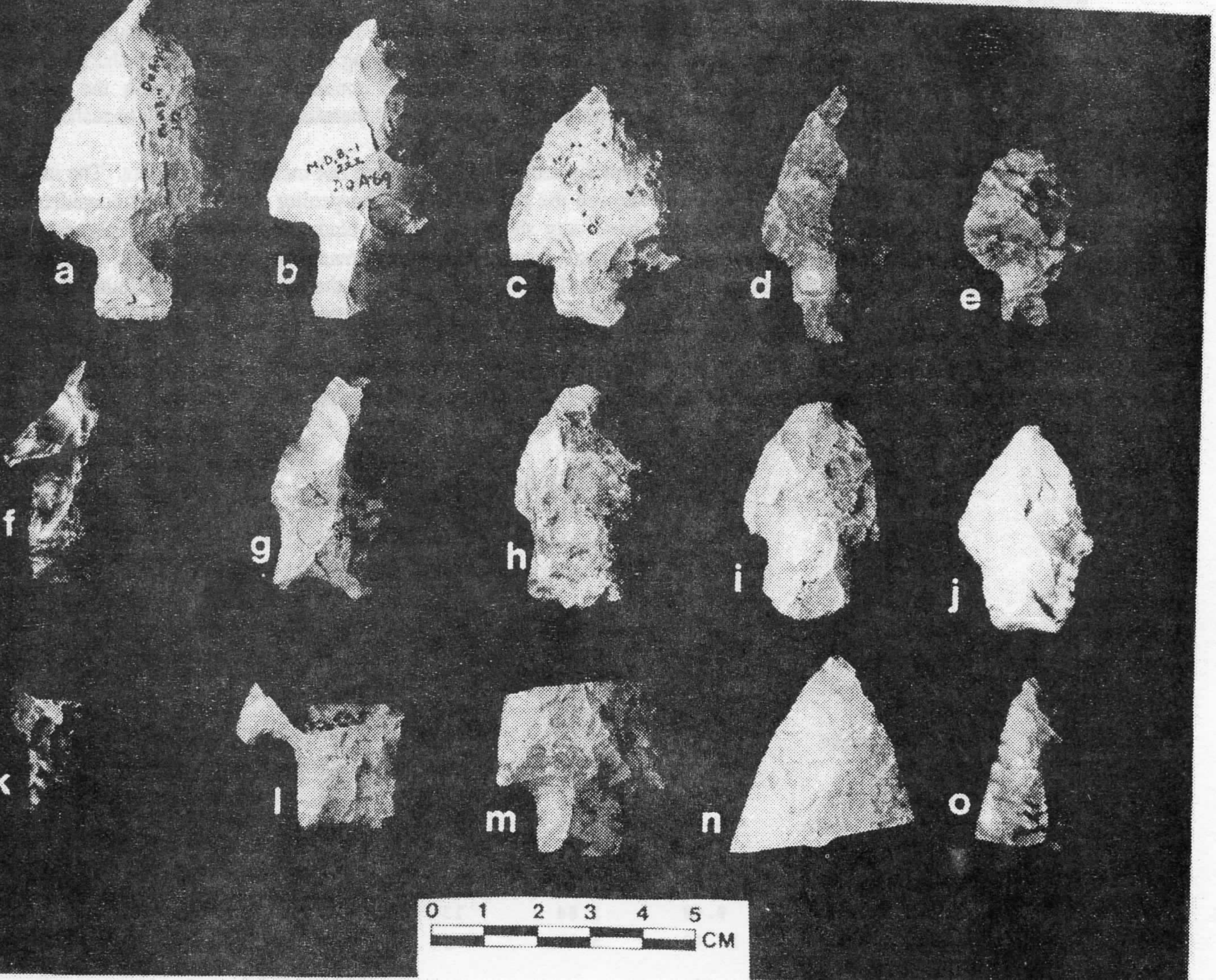
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longer than those of the cherts. This may indicate that the attribute of stem length is not useful for placing these items in space and time as Kenyon (1980a) has done in his study. However, there also may be additional factors involved other than the type of lithic material used. These factors will be addressed in more detail when examining variability through time.

b) Variation Due to Resharpening. While blade length and overall length are affected by lithic material they are also affected by resharpening. Some points with very short blades (Figure 6f-j) suggest that this is the case. It is also suggested by other data. For example in both the chert samples from Brodie and Parkhill, the attributes of blade length and overall length are by far the most variable as measured by the coefficient of variation. This is not the case with the metasediment section of the Brodie sample. In the metasediment sample, blade length is the least variable attribute, and overall length is the third least variable. This ordering would suggest that resharpening does not markedly affect those items made from metasediments. Such a conclusion concurs with the preceding discussion where it was suggested that metasediments are more coarse and therefore, more difficult to resharpen.

As stated earlier, the shoulder widths of heavily recycled bifaces were not included in the data. The inclusion of these measurements would have seriously skewed the data. Heavy resharpening should also be considered as a factor skewing shoulder width. Some points have very short and narrow blades (see Figure 6f-j) suggesting that heavy resharpening would not only diminish the blade length, but also decrease the shoulder width. In support of this, the shoulder width for the total sample from the Parkhill data is in fact the most variable attribute of all basal attributes, as measured by the coefficient of variation (see Table 3). Also, taking a glance at the Coefficients of Variation (see Table 4) for the basal attributes from various other Broadpoint sites, apart from the Brodie site, the coefficient value for shoulder width is either the most variable or the second most variable. This suggests that the attribute of shoulder width is influenced by various constraints, one of which may be resharpening.

Table 3: Parkhill Broadpoint Metrics

	MEAN (mm)	STANDARD DEVIATION	SAMPLE SIZE	COEFFICIENT OF VARIATION
Stem Length	16.97	2.21	10	13.06
Shoulder Width	34.60	6.38	6	18.44
Stem Width	21.51	3.86	11	17.95
Basal Width	19.43	3.53	6	18.17
Tip Bluntness	10.61	2.19	7	20.64
Tip Angle	34.43	4.47	7	12.98
Blade Length	43.10	16.41	6	38.07
Shoulder Height	19.31	2.95	9	15.28
Overall Length	59.45	11.86	4	19.95
Stem Thickness	7.90	1.15	12	14.56
Maximum Thickness	9.68	1.84	13	19.01
Weight	17.40	5.37	5	30.86

The one exception where shoulder width is less variable occurs at the Brodie site. Regardless of material, shoulder width is either the least or second least variable basal characteristic (see Table 2). The Brodie shoulder width varies less than any of the other sites (Table 4). For metasediment bifaces, this may simply reflect a similar situation as regards to the characteristics of overall length and blade length. In essence, the coarse-grained items are not as highly resharpened due to the actual toughness of the lithic material.

Yet, this does not explain the less variable chert points in the Brodie sample. It is possible that this reflects their placement in time. It has been suggested (see below) that earlier broadpoint sites have bifaces with much broader blades and more pronounced shoulders. Those of later sites are narrower with less pronounced shoulders. At Brodie, the bifaces tend to be narrow and thus could be mainly later in time. Therefore, it is possible that the Brodie bifaces were narrow-shouldered at the beginning of their use life. By extension, their shoulder widths could not have been and were not markedly affected by resharpening.

Table 4: Coefficients of Variation*

SITE	STEM LENGTH	SHOULDER WIDTH	STEM WIDTH	BASAL WIDTH
Davidson	19.56	20.34	15.26	10.25
Sadler	16.31	15.70	12.43	12.00
Desjardins	20.92	14.73	14.53	12.83
Parkhill	13.06	18.44	17.95	18.17
Adder Orchard	21.20	14.52	13.58	12.37
Brodie	23.19	12.68	14.66	16.81
H. Golf Club	18.13	18.36	11.64	14.03

*Data based on Kenyon (1980a, 1983); it excludes sites where attributes were measured from photographs.

c) Variation Through Time. As noted earlier, Kenyon (1980a) has worked out a tentative temporal sequence for some broadpoint sites. This temporal sequence is based on basal characteristics which are not believed to be affected by resharpening or by the use of metasediments. The characteristics include shoulder width, stem width, stem length and basal width. However, from preceding discussions, some of these attributes do seem to be influenced or affected by raw material and resharpening in complex ways. For the time being, all of the basal characteristics are assumed to be unbiased variables.

By using these basal attributes, the temporal relationships of both the Brodie and Parkhill samples to other Broadpoint samples will be determined. Other samples compared include the Ontario sites of Davidson, Sadler, Desjardins and Hamilton Golf and Country Club. The first three sites are in the Ausable cluster. Sites from the United States are, Doerschuk (North Carolina), Weir (New York), and Oatman (New York).

The summary statistics for the hafting elements are presented in the Table 5. From these data, excluding Brodie and Parkhill (which have been added in this report), Kenyon (1980a) has worked out a tentative temporal sequence for these sites. He has proposed that the earliest site is Doerschuk, followed by Davidson, Sadler, Desjardins, Oatman, Hamilton Golf Club, and finally by Weir.

Table 5: Summary Statistics For Hafting Element Attributes

		Shoulder Width		Stem Width		Basal Width		Stem Length	
Site	N	X	S	X	S	X	S	X	S
Doerschuk	14	43.17	4.65	23.81	3.10	20.79	2.49	15.89	3.66
Davidson	7	41.29	8.40	24.71	3.77	22.14	2.27	17.43	3.41
Sadler	12	37.58	5.90	23.00	2.86	21.83	2.62	18.58	3.03
				(N=11)		(N=6)		(N=10)	
Parkhill	7	35.69	6.50	21.51	3.86	19.43	3.53	16.92	2.21
Desjardins	40	33.68	4.96	21.40	3.11	19.48	2.50	16.25	3.40
H. Golf C.	12	33.17	6.09	20.45	2.38	17.75	2.49	10.92	1.98
Oatman	15	31.74	5.31	21.05	3.48	19.43	3.68	13.45	1.87
				(N=46)		(N=45)		(N=46)	
Brodie	38	29.82	3.77	18.89	2.77	17.67	2.97	15.05	3.49
Weir	22	36.78	6.13	19.87	2.87	14.52	3.03	12.28	1.28

N=sample size; X=mean; S=standard deviation (Table based on Kenyon 1980a:36).

In this scheme, there is a general decrease in overall dimensions for the four basal attributes through time. The larger and broader bifaces with longer stems are earlier in time, while the smaller narrower bifaces with shorter stems are later.

From Table 5 it is seen that the Parkhill bifaces are generally large and are very close in all four basal attributes to the Ausable sites of Sadler and Desjardins, especially Desjardins. Shoulder width for Parkhill is very similar to that of Desjardins, and even though previous discussions have indicated that shoulder width may be affected by resharpening, this would suggest that resharpening may not be that much of a skewing factor in these samples.

In contrast to Parkhill, the Brodie site does not fit very well into Kenyon's temporal sequence. Table 5 shows that the means of the attributes from the Brodie sample are dissimilar to the other sites and are not close in all of these attributes to any one site. For shoulder width the bifaces are closest to the ones from Oatman; for stem width, Weir; for basal width, Hamilton Golf Club; and for stem length, Desjardins. However, while the Brodie sample is not close to any one site, it appears to be closer to the proposed later sites such as Oatman, Weir, and Hamilton Golf Club. These are sites which have relatively narrow shoulders, narrower stem and basal widths, and shorter stems.

That the Brodie sample does not seriate very readily, may indicate that the whole suggested sequence is erroneous. Raw material and resharpening could be affecting the attributes which have been used to seriate the sites as suggested by the Brodie and Parkhill data discussed earlier. Thus, the attributes used in the seriation are not simply measuring a time sequence, but rather the types of material used, or the varying degrees of resharpening and therefore, degrees of tool kit exhaustion.

There are however, other possible explanations. One is the actual length of occupation of the site. Kenyon's (1980a) seriation assumes that each site was occupied once or a minimum number of times, and that the occupation(s) was for a very brief amount of time in the actual period of broadpoint use. However, if a site should be occupied more than once over a long period of time, this would skew the placement of the site in a temporal sequence.

This is a real possibility with the Brodie sample, since broadpoints were used for almost 1000 C-14 years. The Brodie sample, when compared with Parkhill, is much more variable in terms of size and shape of the bifaces. As well, the Parkhill sample fits into Kenyon's temporal sequence, while Brodie does not. Hence, it is possible that Brodie does not seriate well because it represents several occupations throughout the time span of broadpoint use, although admittedly, largely in the later part of that span.

Other data are consistent with this explanation. For example, when compared to all Kenyon's samples which were not measured from photographs, Brodie exhibits the most or second most variation in three of the four basal characteristics, using the coefficient of variation (see Table 4). A greater degree of variability would be expected if a site represents several occupations, because characteristics change through time and therefore, the ultimate sample would represent a combination of these different occupations. Also consistent with this explanation is the fact that the sample not only includes the odd broad-bladed "Christmas Tree" form which may be earlier (e.g. Figure 5i), but also, some which may be very late. Among the latter there is type of biface which is generally smaller than the rest of the bifaces and has an excurvate blade (Figure 6a-e). This type of biface may represent a transition between the "broadpoint" horizon and the succeeding Small-point culture (see Spence and Fox 1986). These smaller Brodie bifaces are similar in appearance to some points from the Innes site (Lennox 1986:252), a Small-point component. Although these smaller Brodie bifaces are in the upper size range for Innes points, in outline shape, they are quite similar to some Innes forms (Lennox 1986: Figure 10, 4). Therefore, the presence of these apparent transitional bifaces along with the "Christmas Tree" forms would seem to support the idea that the Brodie site was not occupied for a short period, but was inhabited on several occasions over a considerable time.

A long-term occupied site may also explain other discrepancies between the Brodie data and Kenyon's (1980a). As noted earlier, in the Brodie sample there was a significant difference in stem length between metasediments and cherts, with the former being notably longer. Kenyon (1980a) had found no significant difference for stem length between the two lithic classes. However, this does not necessarily mean that it was the lithic material which had caused the variability in the Brodie sample. Kenyon (1983:11; 1980a) has suggested that metasediments were used in earlier time periods and gradually fell out of use or use tailed off, because the smaller and narrower bifaces could be more easily made from cherts (ie. they do not require large flaw free materials). Also, the metasediments have longer stems characteristic of the presumed earlier sites (see Table 5). Therefore, the metasediments may primarily represent an earlier occupation at Brodie, whereas the cherts represent several occupations which include those bifaces later in time with shorter stems.

The poor seriation of the Brodie sample therefore, could be due to several occupations over a long time span. However, there are still other possible explanations. One concerns spatial variation. Kenyon (1983:11) has suggested that the broad-bladed "Christmas Tree" points (Davidson, Sadler) represent relatively early sites. From this type of point, in the east (Niagara Peninsula) "the points retain the basic trianguloid outline of their blades, but through time the stems become more contracted and shorter" (Kenyon 1983:11). In the west (southwestern Ontario and adjacent Michigan and Ohio), a different sequence of development from the original broad-bladed form is suggested. "The stems retain the long, parallel-sided form, but the blades become increasingly narrower and more excurvate" (Kenyon 1983:11). Thus, spatial variation may be affecting the placement of the Brodie sample in the time sequence. It does not seriate well with Kenyon's (1980a) "later" sites because these samples are from eastern regions where a different sequence evolved. This is supported by the Parkhill data. For not only is Parkhill presumed early in time like the Ausable sites, but it is also from the same area. Therefore, it is perhaps not surprising that Parkhill seriated so well in the temporal sequence, while the Brodie sample did not.

Conclusions

A number of conclusions concerning broadpoints may be drawn from this analysis of the Brodie and Parkhill samples. First, attributes not affected by lithic material are stem width, basal width, and shoulder width. Data from the Brodie site suggests that variation of stem thickness is also not always correlated with lithic type. Attribute variations which are correlated with lithic type include, blade length, overall length stem length and weight.

Attempts were made to place Brodie and Parkhill into a temporal sequence drawn up by Kenyon (1980a), by using basal attributes. Parkhill seriated into this sugggested temporal sequence, but Brodie did not. Three explanations were put forward to account for this. The first was that the suggested sequence was not measuring time differences, but rather lithic material properties and the degree of tool kit exhaustion. This may be the case, but the other explanations seem more likely.

Secondly, the inconsistency may be explained by the length of occupation of a site. It would seem that the longer a site had been occupied, the more variation or modes a site would exhibit. The Brodie site material would seem to support this statement (see Table 4). The means for each of the four hafting attributes in the Brodie sample are closer to four different sites, and do not fit into the temporal sequence at all. This could be due in part to various occupations of the site through time, reflecting different and changing manufacturing styles. Identifying long-used locations so that data skewing can be controlled for in future seriation attempts is difficult. Yet, measures of sample variability such as coefficients of variation may be useful in identifying such sites; that is, long-occupied sites should have much more variable samples.

Thirdly, increasing spatial variability through time may explain the difficulty in seriating the Brodie site. Kenyon (1983) has suggested that the earlier "Christmas Tree" broadpoint forms developed into two distinct regional (east and west) sequences. Thus, comparative seriation is possible only when samples from the same regions are plotted. Brodie does not seriate well with the "later" sites because it is in the western evolutionary sequence, while the other "later" sites are in the eastern sequence.

This report has just briefly covered some of the larger gaps in Broadpoint research. Further discussion will be needed to address the discrepancies between the Brodie and Parkhill data and Kenyon's (1980a) data, and what other factors will produce variation within the broadpoints. Further research is also needed to determine the actual distribution of broadpoint sites in Ontario; the dating of the sites; and the uses of the broadpoints.

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APPENDIX 1

Parkhill Measurements

Cat. #	TB	TA	BL	SL	ShH	OL	ShW	SW	BW	ST	MT	W
1168 U	13.8	41	32.7	----	----	----	29.0	23.2	----	9.1	10.1	14.5
1211 K	9.8	31	43.1	14.2	16.2	59.4	26.0	16.6	14.9	8.1	9.6	11.5
593 B	----	--	----	14.9	16.6	----	----	----	----	7.2	9.9	----
1267 0	----	--	----	17.7	21.3	----	----	26.1	25.0	9.7	12.0	----
1174 O	11.7	34	48.1	16.3	19.9	68.2	----	23.4	20.4	7.0	10.1	19.5
1253 O	11.4	36	----	----	----	----	----	----	----	----	8.7	----
1241 O	----	--	----	17.6	19.2	----	37.9	19.2	17.2	8.7	9.6	----
1181 O	E----	--	----	18.3	20.4	----	42.9	20.4	----	6.0	8.3	----
1261 O	P----	--	----	----	----	----	----	----	----	----	15.9	----
1240 O	P----	--	----	----	----	----	----	----	----	----	16.6	----
1173 O	8.1	29	43.3	20.3	24.1	67.5	33.1	17.1	18.0	9.0	12.0	16.0
1161 O	P----	--	80.2	14.5	17.8	98.2	39.3	29.9	23.0	9.0	10.2	48.5
1180 O	S 7.7	31	21.2	19.2	21.3	42.7	----	22.8*	21.1	7.1	7.1	----
1458 O	----	--	----	17.3	----	----	----	17.0	----	6.4	7.2	----
1252 O	----	--	----	13.4	14.8	----	38.7	28.5	----	8.1	8.2	----
1196 O	11.8	39	70.2	----	----	----	----	22.3	----	8.4	13.1	25.5

All measurements are in millimetres except for tip angle which is in degrees, and weight which is in grams.

Key: U = Unidentified B = Bayport O = Onondaga Chert

P = Preform K = Kettle Point Chert

S = Unilaterally Shouldered Biface E = End Scraper

*Shoulder width measurement excluded from calculations because of recycling.

APPENDIX 2

Brodie Measurements

Cat. #	TB	TA	BL	SL	ShH	OL	ShW	SW	BW	ST	MT	W
211 O	9.0	30	55.6	----	----	63.5	28.0	22.1	21.0	9.6	11.6	21.0
150 O	----	--	----	14.9	15.7	----	----	20.8	21.6	8.0	8.5	----
209 O	7.0	25	48.7	9.1	13.0	62.0	27.6	20.6	19.2	8.9	10.5	15.5
149 O S	10.0	27	43.0	16.0	18.5	61.5	31.0*	18.2	17.2	11.5	14.4	17.0
177 O	11.6	40	33.0	13.0	15.0	48.1	28.3	18.3	16.4	9.3	11.0	12.0
17 O	9.9	29	----	----	----	----	----	----	----	----	11.1	----
210 O	9.4	31	46.0	12.9	14.0	60.8	31.8	16.3	16.7	8.0	10.3	14.5
199 O	----	--	----	----	----	----	----	----	----	----	11.4	----
203 O	----	--	----	15.7	18.0	----	----	19.7	19.1	9.0	9.5	----
212 O	6.9	23	62.3	16.0	18.2	81.0	26.7	22.3	21.0	9.7	12.8	23.0
200 O	----	--	----	14.9	17.4	----	35.9	23.2	20.7	8.1	10.1	----
204 O	10.0	35	----	----	----	----	----	----	----	-----	8.2	----
202 O	10.6	37	----	----	----	----	----	----	----	-----	8.0	----
208 O	12.6	35	24.0	16.0	18.5	42.8	26.0	20.0	20.6	10.0	12.2	12.0
213 O	10.5	31	39.4	14.0	16.3	55.8	29.0	19.4	18.8	11.0	13.0	17.0
214 O	12.1	32	----	----	----	----	----	----	----	----	12.7	----
197 O P	----	--	----	----	----	----	----	----	----	----	10.2	----
215 O S	7.2	25	41.9	13.6	16.5	58.5	21.3*	16.7	14.7	7.8	9.5	9.5
206 O	----	--	----	10.7	17.1	53.2	29.4	16.0	18.0	9.5	9.9	----
216 O	5.5	25	38.5	14.5	15.2	55.1	25.0	19.2	----	11.5	11.8	10.5
217 O	----	--	----	11.0	13.5	----	32.4	16.5	15.9	7.3	9.6	----
138 O	7.9	28	40.4	12.3	14.8	55.4	27.5	17.7	17.0	10.2	12.2	14.0
207 O D	8.1	22	58.5	14.5	17.0	75.6	26.1*	23.2	23.6	9.5	11.2	14.5
148 O	10.3	33	21.0	13.0	18.4	39.5	25.2	17.8	14.6	9.2	9.2	6.5
176 O	11.6	36	55.5	14.9	17.7	73.3	36.3	22.3	15.8	7.4	10.4	23.0
205 O D	----	--	----	12.0	14.2	----	23.1*	20.4	20.2	7.9	8.1	----
173 O	7.8	39	42.0	14.2	22.3	64.3	36.6	15.1	15.1	8.6	9.7	14.5
218 O	11.3	33	29.3	----	----	----	24.1	16.1	----	9.1	9.1	----
154 O S	14.4	39	25.3	14.3	16.7	42.2	27.0*	17.8	17.3	8.6	9.3	8.0
147 O	6.6	30	32.5	----	----	----	----	----	----	8.1	11.2	9.0
198 O	16.5	41	----	----	----	----	----	----	----	----	13.7	----
201 O	11.1	31	56.5	18.5	20.7	77.6	37.1	21.0	18.4	9.2	12.7	26.0
143 O	9.0	31	33.3	8.5	18.0	51.5	26.0	17.1	15.1	10.2	10.7	12.5
140 O	7.2	29	49.4	12.1	15.3	64.9	33.1	18.4	16.4	7.7	10.4	16.0
225 SE	11.6	29	53.0	14.7	18.0	70.8	29.8	21.1	20.2	8.7	11.4	22.0
224 SE	13.1	34	35.0	14.1	18.0	52.8	27.5	18.3	13.2	8.0	9.0	12.5
226 SE	13.0	35	27.0	17.2	21.7	49.0	26.7	18.2	13.3	9.3	10.0	11.0
227 SE	11.6	37	32.2	15.0	17.9	50.0	27.8	19.1	18.8	9.5	12.0	13.5
228 SE	----	--	----	11.4	13.0	----	32.1	21.2	21.1	9.3	10.5	----
219 U	10.8	36	42.6	20.2	20.8	63.3	30.3	23.3	22.1	9.0	12.0	19.0
222 U	11.6	38	38.1	17.5	21.8	59.9	33.5	14.4	13.0	9.4	10.2	14.5
144 U D	----	--	----	15.2	16.9	----	21.0*	18.2	16.8	9.4	10.2	----
151 U	11.2	37	23.5	17.0	20.0	43.5	24.8	17.4	18.8	9.6	9.7	9.0
152 U	14.2	44	23.8	20.7	21.4	45.3	33.1	20.3	16.8	8.2	9.5	11.0
79 U S	----	--	----	16.6	18.9	----	----	----	12.7	5.2	6.5	----
153 K	----	--	----	----	----	----	----	----	----	11.9	13.7	----
220 K	----	--	----	15.3	19.2	----	29.0	19.4	15.8	11.2	12.0	----
221 K	10.3	35	34.5	14.4	16.4	51.1	27.2	13.4	----	7.5	8.7	8.5
205 K	----	--	----	11.4	11.7	----	----	----	----	7.4	7.8	----
185 K	17.3	41	22.1	12.0	12.7	35.0	24.7	10.3	9.6	5.2	6.0	4.5
223 A	11.2	43	35.2	10.7	10.9	46.1	33.3	15.7	14.1	7.0	8.6	10.5
87 M	----	--	----	19.0	20.9	----	30.5	17.5	20.0	10.2	10.5	----

Cat. #	TB	TA	BL	SL	ShH	OL	ShW	SW	BW	ST	MT	W
146 M	----	--	----	18.5	19.6	----	33.3	23.0	21.0	8.6	9.6	----
93 M	9.3	31	----	----	----	----	----	----	----	----	10.8	----
233 M P	10.1	40	----	----	----	75.8	----	----	16.4	----	16.9	37.5
234 M	9.1	34	69.1	15.5	17.0	86.4	37.1	21.2	19.2	9.8	10.7	38.5
172 M R	13.4	40	66.2	21.5	23.7	90.0	28.7	21.6	19.0	8.1	13.1	30.5
232 M P	9.3	32	----	----	----	76.4	----	----	----	----	11.5	28.5
231 M E	----	--	----	27.0	29.2	----	30.6	18.7	18.0	10.6	11.8	----
230 M P	13.8	51	----	----	----	----	----	----	----	----	26.7	134.0
145 M S	----	--	----	20.6	21.9	----	----	20.3	20.9	7.2	10.0	----

Key:
O = Onondaga   SE = Selkirk   U = Unidentified Material
A = Ancaster   M = Metasediment   K = Kettle Point
P = Preform   S = Unilaterally Shouldered Biface
E = End Scraper   D = Drill   R = Rubbed Tip

*Shoulder widths excluded from calculations due to heavy recycling.